10th Class 2017

Chemistry	Group-II	Paper-II
Time: 1.45 Hours	(Subjective Type)	Marks: 48

(Part-I)

2. Write short answers to any FIVE (5) questions: 10

(i) Define the Law of Mass Action.

Ans This law states that "The rate at which a substance reacts is directly proportional to its active mass and the rate of reaction is directly proportional to the product of active masses of the reacting substances."

(ii) What do you mean by equilibrium constant?

Ans At equilibrium rate:

The rate of forward reaction = The rate of reverse reaction

$$k_f [A][B] = k_r [C][D]$$

$$\frac{k_f}{k_r} = \frac{[C][D]}{[A][B]}$$

Where $K_c = \frac{k_f}{k_r}$

K_c is called equilibrium constant. It is represented as:

$$K_c = \frac{[C][D]}{[A][B]}$$

(iii) Write two characteristics of forward reaction.

Ans 1. It is a reaction in which reactants react to form products.

2. At initial stage, the rate of forward reaction is very fast.

(iv) How direction of a reaction can be predicted?

Ans Direction of a reaction at a particular moment can be predicted by inserting the concentration of the reactants and products at that particular moment in the equilibrium expression.

(v) Why BF_3 behaves as a Lewis acid?

Ans According to Lewis concept of acid:

An acid is a substance which can accept a pair of electrons. In BF_3, the central atoms have only six electrons around them, therefore, these can accept an electron pair. That's why, BF_3 behaves as a Lewis acid.

(vi) Prove that water is an amphoteric species.

Ans In chemistry, an amphoteric specie is a molecule or ion that can react as an acid as well as a base. Many metals (such as copper, zinc, tin, lead, aluminium and beryllium) form amphoteric oxides or hydroxides.

Water is an amphoteric specie, *i.e.*,

$$H_2O + HCl \longrightarrow H_3O^+ + Cl^-$$

(vii) Define pH. What is pH of pure water?

Ans pH is the negative logarithm of molar concentration of the hydrogen ions, *i.e.*, $pH = -\log [H^+]$.

The pH value of pure water is 7.

(viii) How are the soluble salts recovered from water?

Ans The soluble salts are recovered from water by evaporation or crystallization.

3. Write short answers to any FIVE (5) questions: 10

(i) Define Homocyclic compound.

Ans Homocyclic or carbocyclic compounds contain rings which are made up of only one kind of atoms, *i.e.*, carbon atoms.

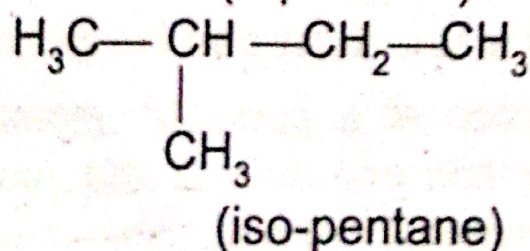
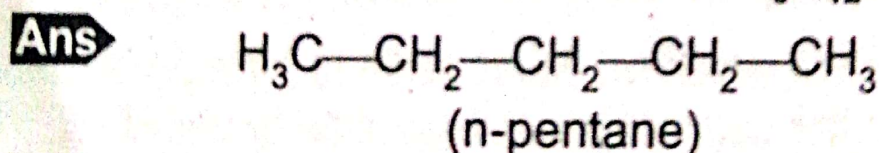
(ii) Describe two isomers of C_5H_{12}.

Ans

$$H_3C—CH_2—CH_2—CH_2—CH_3$$

(n-pentane)

$$H_3C—\underset{\displaystyle CH_3}{\underset{|}{CH}}—CH_2—CH_3$$

(iso-pentane)

(iii) What are Alkyl radicals? Also write their general formula.

Ans Alkyl radicals are derivatives of alkanes. They are formed by the removal of one of the hydrogen atom of an

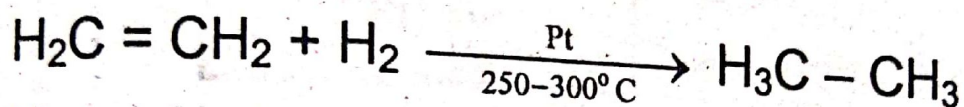
alkane and are represented by a letter 'R'. Their general formula is C_nH_{2n+1}.

(iv) Why the alkenes are called olefins?

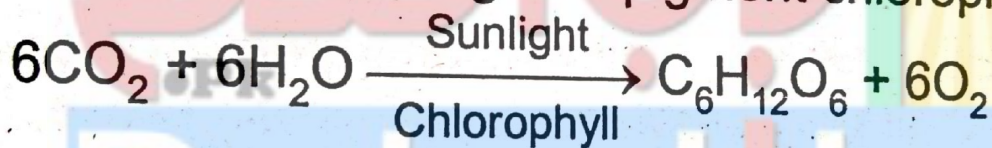
Ans Alkenes are called olefins because first members form oily products when react with halogens.

(v) Write the equation for the hydrogenation of alkenes.

Ans Hydrogenation means the addition of hydrogen to an unsaturated hydrocarbon in the presence of a catalyst like Ni, Pt, etc.

$$H_2C = CH_2 + H_2 \xrightarrow[250-300^\circ C]{Pt} H_3C - CH_3$$

(vi) How plants synthesize carbohydrates?

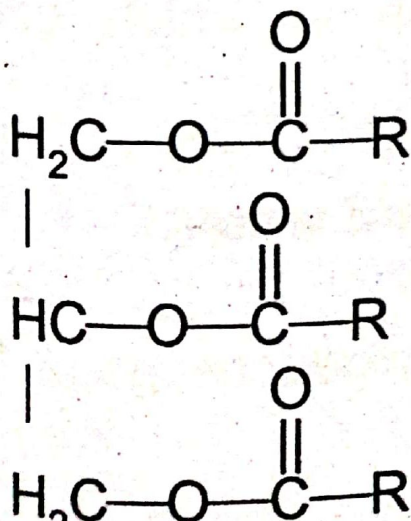
Ans Carbohydrates are synthesized by plants through photosynthesis process from carbon dioxide and water in the presence of sunlight and green pigment chlorophyll.

$$6CO_2 + 6H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2$$

(vii) Define hydrocarbons.

Ans The organic compounds made of carbon, hydrogen and oxygen are called as hydrocarbons *e.g.,* alkanes, alkenes and alkynes.

(viii) Give the general formula of lipids.

Ans General formula of lipids is:

```
              O
              ||
H2C—O—C—R
 |            O
 |            ||
HC—O—C—R
 |            O
 |            ||
H2C—O—C—R
```

4. Write short answers to any FIVE (5) questions: 10

(i) Write percentage composition of atmosphere by volume.

Ans Percentage composition of atmosphere by volume is shown in the following table:

Gas	% by Volume
Nitrogen	78.09
Oxygen	20.94
Argon	0.93
Carbon dioxide	0.03

(ii) Give two effects of SO_2.

Ans The two effects of SO_2 are:

1. It forms sulphuric acid which damages buildings and vegetations.
2. SO_2 causes suffocation, irritation and reverse respiratory problems to asthmatic people.

(iii) Define ozone and ozone hole.

Ans **Ozone:**

Ozone is an allotrope of oxygen. Its maximum concentration called ozone layer lies in stratosphere region about 25 to 30 km away from Earth's surface.

Ozone hole:

Ozone hole is the region in which ozone layer depletes in atmosphere.

(iv) Define soft water and hard water.

Ans **Soft water:**

Soft water is that which produces good latter with soap.

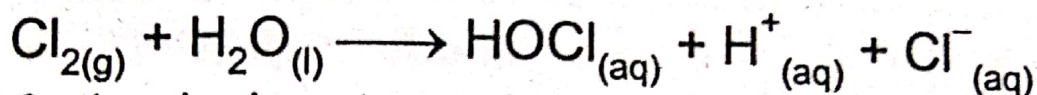
Hard water:

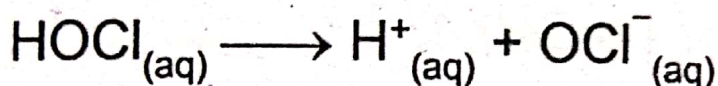
Hard water is that which does not produce lather with soap.

v) **Give chemistry of swimming pool cleanliness.**

Ans **Chemistry of swimming pool cleanliness:**

Swimming pools are cleaned by chlorination process. It is the addition of chlorine solution in swimming pools. Chlorine kills bacteria and other microorganisms. Cl_2 itself does not kill rather it dissociate in water to form hypochlorous acid (HOCl) and hydrochloric acid.

$$Cl_{2(g)} + H_2O_{(l)} \longrightarrow HOCl_{(aq)} + H^+_{(aq)} + Cl^-_{(aq)}$$

HOCl further ionizes to produce hypochlorite and proton.

$$HOCl_{(aq)} \longrightarrow H^+_{(aq)} + OCl^-_{(aq)}$$

Both the products HOCl and OCl^- kill bacteria and microorganism.

vi) **Define gangue and metallurgy.**

Ans **Gangue:**

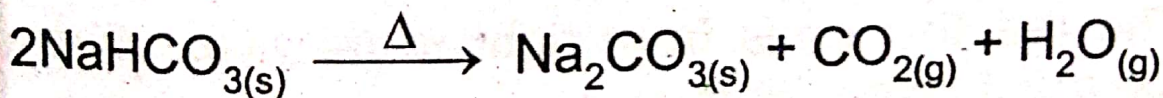
The earthly and other impurities associated with the minerals are known as gangue.

Metallurgy:

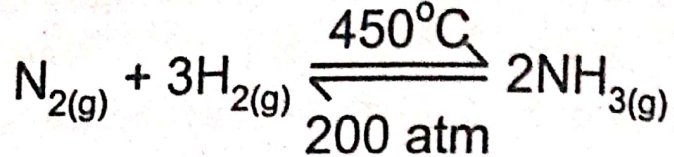
The process of extraction of metal in pure state on a large-scale from its ore by physical or chemical means is called as metallurgy.

vii) **How Na_2CO_3 is obtained from $NaHCO_3$?**

Ans Sodium bicarbonate is heated to get sodium carbonate:

$$2NaHCO_{3(s)} \xrightarrow{\Delta} Na_2CO_{3(s)} + CO_{2(g)} + H_2O_{(g)}$$

viii) **How ammonia is prepared by Haber's process?**

Ans Ammonia is prepared by "Haber's process". One volume of nitrogen (from air) and three volumes of hydrogen (obtained by passing methane and steam over heated nickel catalyst) is passed over iron catalyst at 450°C and 200 atm pressure.

$$N_{2(g)} + 3H_{2(g)} \underset{200\ atm}{\overset{450^\circ C}{\rightleftharpoons}} 2NH_{3(g)}$$

(Part-II)

NOTE: Attempt any TWO (2) questions.

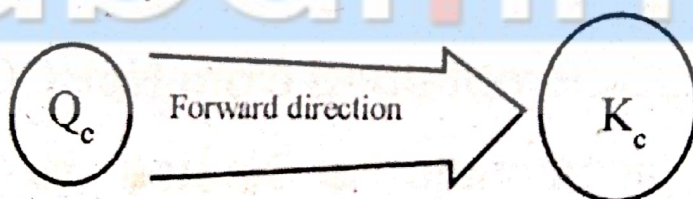
Q.5.(a) What is the importance of equilibrium constant? (4)

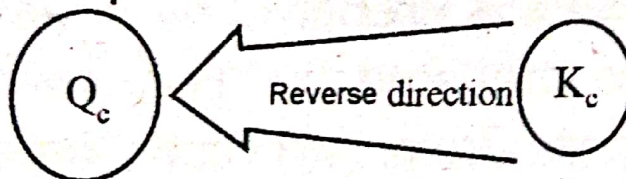
Ans Knowing the numerical value of equilibrium constant of a chemical reaction, direction as well as extent of the reaction can be predicted.

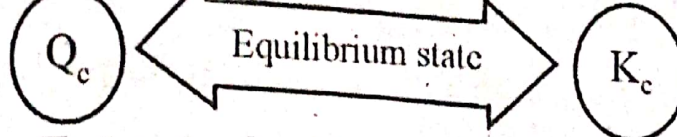
(i) Predicting direction of a reaction:

Direction of a reaction at a particular moment can be predicted by inserting the concentration of the reactants and products at that particular moment in the equilibrium expression. We can make the following generalization about the direction of the reaction.

If $Q_c < K_c$

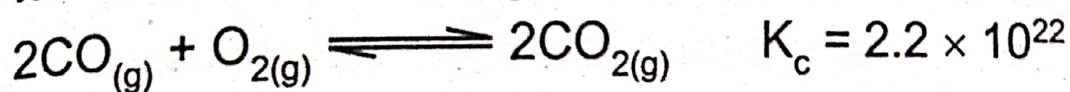
The reaction goes from left to right, *i.e.*, in forward direction to attain equilibrium.

If $Q_c > K_c$

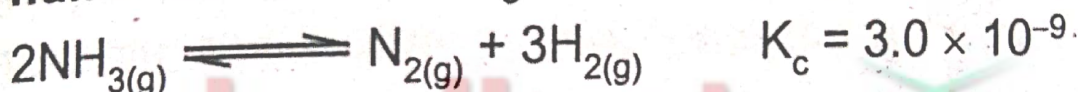
The reaction goes from right to left, *i.e.*, in reverse direction to attain equilibrium.

If $Q_c = K_c$

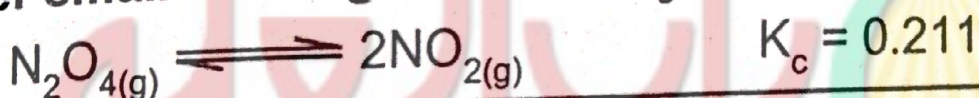
Forward and reverse reactions take place at equal rates, *i.e.*, equilibrium has been attained.

(ii) Predicting Extent of a Reaction:

Numerical value of the equilibrium constant predicts the extent of a reaction. It indicates to which extent reactants are converted to products. In fact, it measures how far a reaction proceeds before establishing equilibrium state. In general, there are three possibilities of predicting extent of reactions as explained below.

Large numerical value of K_c

$$2CO_{(g)} + O_{2(g)} \rightleftharpoons 2CO_{2(g)} \qquad K_c = 2.2 \times 10^{22}$$

Small numerical value of K_c

$$2NH_{3(g)} \rightleftharpoons N_{2(g)} + 3H_{2(g)} \qquad K_c = 3.0 \times 10^{-9}$$

Neither small nor large value of K_c

$$N_2O_{4(g)} \rightleftharpoons 2NO_{2(g)} \qquad K_c = 0.211$$

(b) Write down the uses of following bases: (4)

(i) Sodium Hydroxide

(ii) Calcium Hydroxide

(iii) Magnesium Hydroxide

(iv) Aluminium Hydroxide

Ans **(i) Sodium Hydroxide:**

Sodium hydroxide is used for manufacturing of soap.

(ii) Calcium Hydroxide:

Calcium hydroxide is used for manufacturing of bleaching powder, softening of hard water and neutralizing acidic soil and lakes due to acid rain.

(iii) Magnesium Hydroxide:

Magnesium hydroxide is used as a base to neutralize acidity in the stomach. It is also used for the treatment of bee's stings.

(iv) Aluminium Hydroxide:

Aluminium hydroxide is used as foaming agent in fire extinguishers.

Q.6.(a) Describe uses of Ethene. (5)

Ans Uses of Ethene (Ethylene):

It is used:

(i) for artificial ripening of fruits;

(ii) as a general anaesthetic;

(iii) for manufacture of polythene. Polythene is a plastic material used in packaging, toys, bags, etc;

(iv) as a starting material for the manufacture of a large number of compounds such as ethylene oxide, ethyl alcohol, ethylene glycol, diethyl ether, etc.; ethylene oxide is used as a fumigant, ethylene glycol is used as an anti-freeze, diethyl ether and ethyl alcohol are used as solvents; and

(v) for making poisonous mustard gas which is used in chemical warfare.

(b) Write a note on monosaccharides. (4)

Ans Monosaccharides are simple sugars which cannot be hydrolyzed. These consist of 3 to 9 carbon atoms in their molecules. These are further classified on the basis of number of carbon atoms in their molecules. For example, trioses (3c), tetroses (4c), pentoses (5c) and so on. The most common monosaccharides are hexose sugars like glucose, fructose, etc. The monosaccharides are white crystalline solids. These are sweet in taste and soluble in water.

Q.7.(a) Define refining and write a note on fractional distillation of petroleum. (5)

Ans **Refining:**

Refining process is the separation of crude oil mixture into various useful products (fractions). It is carried out by a process called fractional distillation.

Fractional distillation of petroleum:

The process of the separation of crude oil mixture into various useful products (fractions) is called as fractional distillation. The crude oil is heated in a furnace up to 400°C under high pressure. Then the vapours are passed through a fractionating column from near its bottom. The hot vapours rise upwards in the column and gradually cool down and condense. The vapours of high boiling point fraction (350-400°C) condense first in the lower part of the tower. While the vapours of medium and lower boiling point fractions rise upwards in the tower and condense gradually. Hence the crude oil is separated into various fractions.

(b) Explain any two water-borne diseases. How can these be prevented? (4)

Ans **Water-borne Diseases:**

The important water-borne diseases are as following:

(i) Diarrhoeal diseases:

Intestinal diseases like cholera cause dehydration. Diarrhoea is caused by viruses, bacteria or parasites.

(ii) Dysentery:

It is an intestinal disease caused by certain bacteria or parasites. Severe diarrhoea along with blood or mucous is caused by this disease.

(iii) Cholera:

It is an infectious disease caused by a bacterium vibrios cholerae. This bacterium is found in water contaminated by human faeces. Cholera causes severe diarrhoea and may be fatal.

(iv) Fluorosis:

It is a disease caused by the consumption of excess fluorides. This disease can cause damage of bones and teeth.

(v) Typhoid:

This is a bacterial disease spread by contaminated water or by the food prepared by the contaminated water.